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(54) Filter coupling

(57) A filter, designed to filter milk as it flows into or out of a tanker, comprises a demountable pipe coupling having a female part (not shown) and an externally threaded male part in two sections 3, 4. Section 3 incorporates a filter element of conical form (Fig. 5), and sections 3, 4 push together with flange 7 engaging in recess 8 (Fig. 4) to define a recess which receives an O-ring to make a seal when the resulting male part is screwed into the female part. If section 3 and the filter element are omitted, then section 4 alone is unable to make a seal.

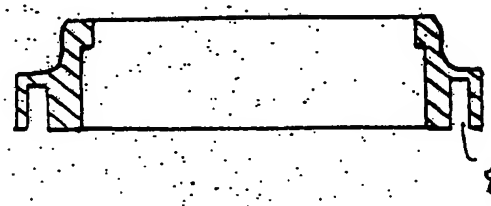

Figure 2

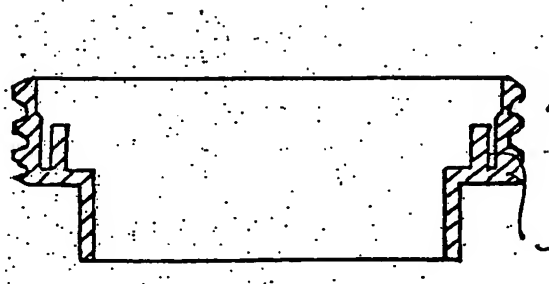

Figure 3

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Figure 1

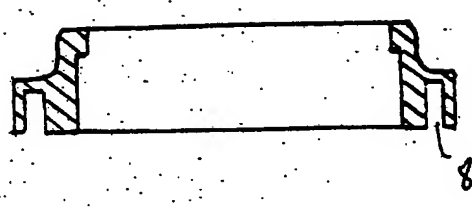

Figure 2

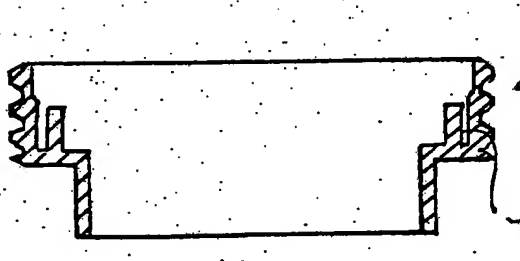

Figure 3

Figure 4

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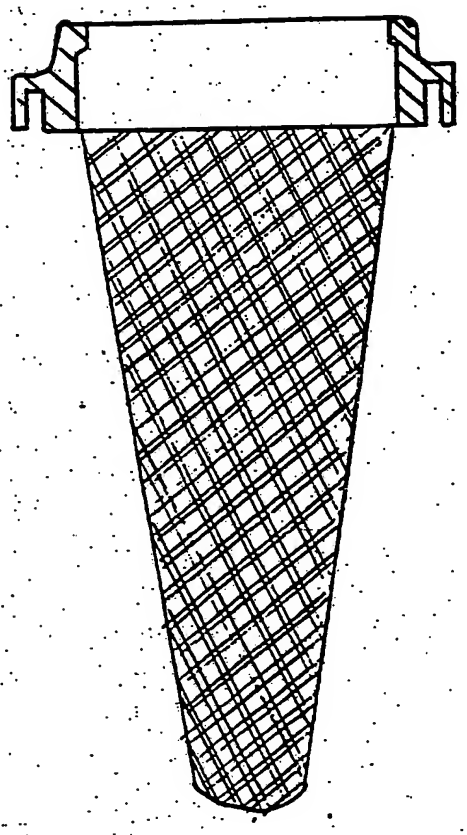

Figure 5

FILTER

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This invention relates to filters and in particular but not exclusively to filters for insertion in couplings between milk tankers and farm milk tanks or dairy depots.

The main contaminant in raw milk is cow hair, but there are also other contaminants such as straw or grass, insects and general rubbish (crisp or sweet packets etc) that find their way into milk tanks on farms, especially if the tank is uncovered or has a loose cover. Milk is collected from the farm tanks by a road tanker, the milk being pumped through a flexible hose coupling attached to the tanker, one tanker often visiting several farms, and then the milk is discharged from the tanker at the dairy depot via the same coupling hose. At present the contaminants in the road tanker (and in extreme cases mice or birds that have entered the coupling hose) are pumped from the road tanker into the dairy depot and filtered out prior to storage and subsequent pasteurising. The filters employed are located in the main supply line, after the pump, and it is not possible to remove the filter for cleaning between tanker discharges without losing the gallonage of milk contained in the supply line system. Each filter must therefore be sufficiently large to cope with a full days milk supply from many tankers.

These large in-line filters have several disadvantages. Firstly they are costly because of their size, but also their use for a full day can enable hairs to align themselves with the flow and work through the filter and this can then be harmful to the subsequent pasteurising plant. There is also

a tendency now that milk collection is more automated (and cleaner) than in the past for the filters to be sterilised by caustic washing of the line each day but not cleaned of particles each day and this can again lead to failure of the filter.

The present invention is directed towards providing a filter that can be used before the dairy depot pump in the depot/tanker coupling or in the farm/tanker coupling.

Accordingly the invention provides a filter coupling comprising a filter mesh having a flange around its outer periphery and a first coupling piece adapted to receive the flange of the filter so that the assembly of the flange and the first coupling piece presents a coupling surface to which a corresponding second coupling piece can be attached.

The invention also provides a coupling comprising a first coupling piece that engages in a sealing configuration with a second coupling piece characterised in that one of the coupling pieces comprises a removeable filter and in the absence of the filter the coupling pieces do not sealingly engage.

A preferred aspect of the invention provides a filter adapted to engage within a first part of a coupling and present a sealing surface to a second coupling piece. Preferably the filter is conical.

The invention is now described by way of example with reference to the accompanying drawings in which:

Figure 1 shows a standard connector,

Figure 2 shows a first connector part according to the invention,

Figure 3 shows a second connector part according to the invention,

Figure 4 shows an assembly of the parts shown in Figures 2 and 3, and

Figure 5 shows a filter according to the invention.

Figure 1 illustrates the male part of a RJT (round joint type) connector that is commonly used to couple milk tankers to a dairy depot or a farm silo, the tanker usually having the female part of the coupling which essentially comprises a threaded nut with an inwardly directed flange at one end. The female part screws on to the male part with its flange end outermost engaging with threads 1 and the nut trapping a hose connection flange against a sealing o-ring (not shown) in a recess 2 on the male part.

Figures 2 and 3 show a split coupling comprising a first part 3 and a second part 4 for use in the invention, the two parts fitting together as shown in Figure 4 to present a coupling that has an identical configuration to the standard RJT coupling shown in Figure 1. The first part 3 of the split coupling is attached as a flange to a conical filter mesh 5 as shown in Figure 5 so that when the two parts of the split

coupling are combined the cone extends through the second part of the coupling.

A split coupling and filter may be installed instead of a standard male RJT at dairy depots. In this instance the second part 4 of the coupling is mounted at the delivery bay and the filter mounted on the first part of the coupling are detached. In order to couple the tankers female RJT connector to the dairy terminal the driver assembles the coupling by sliding the first part into the second part, positions a sealing o-ring in the recess 2 and then screws on the female connector over the threads of the second part 4 thereby retaining the first part 2. The conical filter mesh 5 now extends inwardly to the dairy line and as the milk is pumped from the tanker it enters the wide end of the cone and is filtered by the mesh preventing introduction of contaminants to the dairy line. This filters the milk before the dairy pump and thus protects the pump. After delivery of the milk the female connector is removed. At this stage the o-ring tends to stay in the recess 2 holding the two parts of the split connector together because of the tightening pressure that is applied to couple on the female connector. It is therefore possible for the next tanker to deliver milk without assembling the connector. However the conical filter is comparatively small, being about 50mm to 75mm maximum diameter tapering over a length of about 100mm to 150mm compared with the conventional in-line filter which is cylindrical of diameter 50 to 100mm and 300 to 500mm long. Due to the much reduced filter surface blockage or reduction of flow rate occurs after a lesser throughput of raw milk and so the filter, which in practice will tend to be cleaned only

when necessary, will require frequent rinsing. It is the intention that the filter should be rinsed clean between each tanker discharge, and the mesh area may be adjusted to provoke such regular rinsing. For ease of separation of the split connector and handling the filter assembly is preferably provided with a handle 6.

It is realised that attempts may be made to abuse the split connector, for example by inserting two o-rings into the second part 4 and coupling on the female connector omitting to insert the filter and first part. In order to prevent such abuse the parts of the coupling are provided with interfitting spigots 7 and recesses 8, the spigots being located on the second part 4 so as to prevent sealing by use of an additional o-ring as explained above.

The conical shape of the filter has advantages over a cylindrical filter. With a cylindrical filter there is a tendency for the flow to pass to the far end of the filter and then through the mesh into the surrounding pipe. This causes the mesh to block preferentially at the far end thereby forcing the milk to flow through an earlier portion of the mesh. The cylindrical filters are relatively close fitting within the line and therefore when the milk passes through the filter it has to flow along a restricted annulus around the outside of the filter. When the filter progressively blocks the milk is forced to flow progressively earlier into the restricted annulus and this slows down the flow rate. With a conical mesh the milk flows more uniformly through the entire area of the mesh. Furthermore even if it tends to block then the annulus is not so restricted. It is

possible to utilise a conical filter according to the invention as an in-line filter.

It will be realised that as an alternative, or utilising a different mesh size, it is also possible to use a similar filter connector between the tanker and farm silo. It is possible to use exactly the same configuration as described above, but as the milk is flowing in the opposite direction this means that it is passing from the outside to the inside of the cone. Alternatively a coupling may be provided with a filter cone directed in the opposite direction to that shown in Figure 5. A third option, and one which prevents abuse of the same filter for filling and emptying the tanker with the flows in opposite directions (which would transfer the contaminant filtered out in the first pass from farm to tanker into the dairy depot at the second pass if the filter was not cleaned) is for a gender change coupling to be used by the tanker so that at the farm the tanker has the split male connector and the farm silo the female connector, and then at the dairy depot the tanker reverts to a female connector as described above. This arrangement is particularly advantageous as only the split connector differs from couplings correctly used (gender change connectors usually being carried by tankers). Furthermore only a single split connector and filter design is required, most preferably with a finer mesh at the dairy depot to achieve additional filtration.

It is also envisaged that a split coupling according to the invention may be combined with an adaptor for converting a coupling part to a different size or type. A filter may also

be incorporated into the line within a dairy depot utilising a coupling that will only seal when the filter is present.

Claims

1. A filter coupling comprising a filter mesh having a flange around its outer periphery and a first coupling piece adapted to receive the flange of the filter so that the assembly of the flange and the first coupling piece presents a coupling surface to which a corresponding second coupling piece can be attached.

2. A coupling comprising a first coupling piece that engages in a sealing configuration with a second coupling piece characterised in that one of the coupling pieces comprises a removeable filter and in the absence of the filter the coupling pieces do not sealingly engage.

3. A coupling according to claim 1 or claim 2 in which the coupling is a road tanker coupling.

4. A coupling according to any preceding claim in which the coupling is a round joint type coupling.

5. A coupling according to any preceding claim in which the filter has a flange shaped to receive an o-ring seal and comprises the inner part of a male coupling piece.

6. A coupling according to any preceding claim in which the filter is substantially conical with the cone extending in the direction of flow.

7. A coupling substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

8. A filter substantially as hereinbefore described with reference to and as illustrated in Figure 5 of the accompanying drawings.

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